

**Ouch! Managing Pain and Inflammation in Exotic Pets**  
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Exotic pets present for a variety of reasons, with many requiring some form of analgesia or anesthesia to manage their condition. Exotic pets may be anesthetized or providing analgesia using a variety of parenteral and/or inhalant drugs; however, it is important for veterinarians working with these animals to understand that most of the literature pertaining to analgesics in these species is limited. The purpose of this presentation is to review the common analgesics used for exotic pets.

The provision of analgesics has several inherent benefits. First, pain can actually slow healing times. Not controlling pain will increase recovery and treatment times for an animal. Second, pain can increase anesthetic time and provide inconsistent results. An exotic pet with a contusion on its lateral body wall may take shallow breaths, limiting the amount of inhalant anesthetic delivered to the animal. Finally, analgesics can reduce the amount of anesthesia required for a procedure. This can shorten overall anesthesia times and the risks associated with some anesthetics.

Our current understanding of measuring and controlling painful stimuli in certain exotic pets, such as reptiles, is limited. The primary question being asked by most scientists is whether reptiles have the cognitive ability to understand pain. Some will argue that when a reptile is injected with a medication, and it responds by retracting its leg, that its response confirms that they sense pain; however, others will argue that the example only confirms that these animals can respond to a noxious stimuli via a spinal reflex, and that it is not a cognitive experience. Reptiles have the basic anatomic and physiologic structures required for pain perception found in higher vertebrates, so the author prefers to err on the conservative side and provide analgesics when appropriate. This, however, also poses a problem in reptiles, as there has been even less study attempting to evaluate the pharmacokinetics of analgesics in reptiles. Suffice it to say, there remains much work left to be done.

Exotic pets have evolved to mask their illness. This natural defense mechanism is intended to minimize the likelihood of attracting predators. While this is an important in the wild, it can make the veterinarian's job of assessing pain in their patients more difficult. Many of the clinical signs associated with pain in exotic pets are generic and may be displayed with other diseases too. For example, lethargy, depression, weakness, reduced ambulation, and anorexia are all common findings with patients suffering from pain, but are also common findings with a variety of other diseases (e.g., infectious, toxicoses). Because of the similarity in presentation, it is important for veterinarians to monitor these animals closely. Not managing pain in a patient may delay the rehabilitation time, leading to a reduced likelihood for a successful release of the patient.

There are a number of different analgesics available to manage exotic pet cases. Although local anesthetics, dissociative anesthetics, alpha-2 compounds, inhalant anesthetics, and propofol all provide analgesia, their duration is generally limited to the duration of anesthesia. For those

cases where pre-operative and post-operative analgesia are needed or analgesics are desired for non-surgical issues, opioids and non-steroidal anti-inflammatories should be considered. When considering an analgesic plan for an exotic pet, it is important to consider the situation. The author generally separates these events into three categories: local analgesia, surgical analgesia, and post-operative analgesia. A local analgesic may be used to alleviate the discomfort associated with a focal injury or surgical procedure. The author routinely administers lidocaine or bupivacaine prior to removing an abscess or making a coeliotomy incision. These local analgesics are presumed to provide some analgesia after the completion of a procedure. Analgesics delivered pre- or peri-operatively for a surgical procedure may reduce the amount of other anesthetics required for a procedure. Many of the anesthetics we use (e.g., dissociatives, alpha-2 agonists, propofol, inhalant anesthetics) provide analgesia during a procedure. Other analgesics commonly used during a surgical procedure are the opioids and non-steroidal anti-inflammatories. The opioids and non-steroidal anti-inflammatories are also commonly used in the post-operative period to control pain.

The dissociatives were some of the first anesthetics/analgesics evaluated in exotic pets. These compounds are so-named because they “dissociate” the patient from its environment. Although these compounds are considered to provide general anesthesia, the author considers them to be incomplete. There are two primary dissociative anesthetics used in veterinary medicine: ketamine hydrochloride (Ketaset®; Ft. Dodge Animal Health, Ft. Dodge, IA USA) and tiletamine (Telazol®; Ft. Dodge Animal Health, Ft. Dodge, IA USA). Tiletamine is considered 2-3 times as potent as ketamine. In Telazol®, tiletamine is combined with zolazepam. The zolazepam provides protection against seizures. The primary advantages associated with these compounds are that they are inexpensive, readily available (in the United States), and provide somatic analgesia. The primary disadvantages associated with these compounds are that they do not provide visceral analgesia, have cardiopulmonary depressant effects, do not provide muscle relaxation, and leave the patient with some knowledge of the experience. In some exotic species, such as reptiles, an additional disadvantage has been noted: prolonged recoveries. In some species of reptiles, 24-72 hour recoveries are not uncommon. Part of this is related to the dosing recommendations for these compounds. In the literature, it is possible to find a range of recommended doses. For example, the author has found doses for ketamine hydrochloride to range from 5-88 mg/kg. This is a huge disparity in dosing regimens. It should not be surprising, given these ranges of doses, for veterinarians to experience variable outcomes using these compounds. Because these compounds do not provide muscle relaxation or visceral analgesia, the author does not recommend them as general anesthetics. Instead, the author generally utilizes these compounds as pre-anesthetics and analgesics.

The alpha-2 agonist anesthetics have been used in exotic pets with some success. The two primary alpha-2 agonists used in veterinary medicine (in the United States) are xylazine and dexmedetomidine. The primary advantages associated with these compounds are that they are reversible and provide muscle relaxation and visceral analgesia. The primary disadvantage associated with these compounds is that they can cause cardiopulmonary depression.

Propofol is a non-barbiturate hypnotic. This drug can be used to provide general anesthesia and analgesia during minor procedures or as a pre-anesthetic/analgesic. The primary advantages associated with this drug are that it is associated with rapid recoveries and can be given to affect.

The primary disadvantages associated with propofol are that it can cause apnea and must be given intravenously or intraosseously. If there is perivascular leakage of this compound, the induction may be inconsistent. Perivascular leakage of propofol is not associated with any significant irritation. Fortunately, there is no cumulative effect and additional drug can be given. The author has used this drug extensively in exotic pets to perform surgeries when inhalant anesthetic agents were not available, and found it to be efficient and effective.

Alfaxalone is a neurosteroidal anesthetic that has been found to have excellent sedative effects across a wide range of exotic pets. The author has used dosing rates of 5-15 mg/kg IV and 10-20 mg/kg IM in snakes, lizards, and chelonians. The author primarily uses this anesthetic for sedation to perform diagnostic tests (e.g., imaging), intubate animals, or for minor procedures with local anesthesia (e.g., lidocaine or bupivacaine) with good results.

The inhalant anesthetics remain the preferred method for providing general anesthesia/analgesia during major procedures to exotic pets. The two most common inhalant anesthetics used in the United States are isoflurane and sevoflurane. These compounds are rapidly metabolized by exotic pets, and can be used to provide smooth inductions and recoveries. Preliminary research comparing these two compounds generally shows that sevoflurane does have more rapid induction and recovery periods, but the differences may be inapparent (1-5 minutes) to most clinicians. For the most part, it is the difference in price (sevoflurane costing significantly more) that separates the two inhalants. The primary advantages associated with these compounds are that they provide rapid induction and recoveries, and allow the clinician to have direct and immediate control over the delivery of the anesthetic. The primary disadvantages are that they can induce mild cardiopulmonary depression and require attachment to a vaporizer with a source of oxygen.

The primary long-term analgesics used for exotic pets are non-steroidal anti-inflammatories and opioids. Opioids are classified based on whether they are agonists, antagonists, or a combination of both. There are a number of these compounds available to veterinarians, including butorphanol, buprenorphine, fentanyl, morphine, and hydromorphone. Doses for most exotic species are empirical (Table 1). Non-steroidal anti-inflammatories can be classified into selective and non-selective agents. The selective agents used most commonly in exotic pets are carprofen and meloxicam. Again, for exotic pets, the doses for these drugs are generally based on anecdotal reports.

Table 1. Analgesic doses for exotic pets.

<i>Group</i>	<i>Drug</i>	<i>Dose</i>
Birds	Butorphanol	1-4 mg/kg TID-QID
	Buprenorphine	0.25 mg/kg BID-TID
	Fentanyl	0.2-0.5 µg/kg/min IV
	Gabapentin	3-11 mg/kg SID-BID
	Lidocaine	<5 mg/kg
	Meloxicam	0.2-0.5 mg/kg SID-BID

Carprofen	2 mg/kg BID
Tramadol	5-30 mg/kg PO BID

#### Reptiles

Butorphanol	1-4 mg/kg TID-QID
Hydromorphone	0.1-0.5 mg/kg
Morphine	0.5-1 mg/kg SID-BID
Lidocaine	<5 mg/kg
Meloxicam	0.2-0.5 mg/kg SID-BID
Carprofen	2 mg/kg BID
Tramadol	5-10 mg/kg PO BID

#### Mammals

Butorphanol	0.1-0.5 mg/kg TID-QID
Buprenorphine	0.01-0.1 mg/kg BID-TID
Fentanyl	0.2-0.3 ml/kg
Gabapentin	10-20 mg/kg SID-BID
Hydromorphone	0.05-0.2 mg/kg BID-TID
Lidocaine	<5 mg/kg
Meloxicam	0.2-0.8 mg/kg SID-BID (rodents: 1-2 mg/kg)
Tramadol	5-10 mg/kg PO BID

### Summary

Veterinarians working with exotic pets should be mindful of the potential pain and suffering of their patients. To minimize delays in the time an animal is treated, it is important to provide appropriate analgesia. Because many of the doses for the analgesics available to the exotic pet veterinarian are based on anecdotal recommendations, it is important to recognize that dosing regimens may need to be varied.

### Reference

Carpenter JW. 2018. Exotic Animal Formulary. Elsevier, St. Louis, MO, pp: 701.